

Investment Management Midterm

A

“I pledge my honor that I have not violated the Stern Code of Conduct in the completion of this examination.”

Full Name: _____

NetID: _____

- The exam will last seventy five minutes.
- Total points: 100.
- We highly encourage you to manage your time.
- There are 15 multiple-choice questions and 6 free-response questions.
- You are allowed a calculator.
- A formula sheet is provided on the next page.
- You may only use the blank scratch paper provided at the end of this exam packet.
- Please approximate calculations to two decimal points.

Spring 2026 - Redacted portfolio preview

Questions only - Versions A and B

Prepared collaboratively by the course teaching-fellow team.

Includes adapted course and practice materials.

Gray placeholders mark questions omitted from public release.

Only exam questions and formula sheets are included; blank scratch pages are omitted.

Original question numbers, variant order, and printed page numbers are retained.

Formula Sheet

Time Value of Money	Interest Rate Risk & Yield Curve	Rates and Returns
Present Value (Single Cash Flow) $PV = \frac{FV}{(1 + R)^T}$	Fisher Equation (Exact) $(1 + R_{\text{nominal}}) = (1 + R_{\text{real}})(1 + E[i])$	Effective Annual Rate $EAR = \left(1 + \frac{\text{Quoted Rate}}{m}\right)^m - 1$
Present Value (Multiple Cash Flows) $PV = \sum_{t=1}^T \frac{CF_t}{(1 + R)^t}$	Expectations Hypothesis (2-year Exact) $(1 + Y_0(2))^2 = (1 + Y_0(1))(1 + E[Y_1(1)])$	Continuous Compounding $EAR = e^{\text{Quoted Rate}} - 1$
Perpetuity $PV = \frac{CF}{R}$	Expectations Hypothesis (T-year Approx) $Y_0(T) \approx \frac{1}{T} (Y_0(1) + E[Y_1(1)] + \dots + E[Y_{T-1}(1)])$	Future Value (Continuous Compounding) $FV = PV \times e^{R \times T}$
Annuity $PV = \frac{CF}{R} \times \left[1 - \frac{1}{(1 + R)^T}\right]$		Holding Period Return (HPR) $HPR = \frac{V(T)}{V(0)} - 1$
Growing Annuity $PV = \frac{CF}{R - g} \times \left[1 - \frac{(1 + g)^T}{(1 + R)^T}\right]$		Annualized HPR $\text{ann.HPR} = \left(\frac{V(T)}{V(0)}\right)^{1/T} - 1$
Present Value of an Annual-Pay Bond $PV = \sum_{t=1}^T \frac{C}{(1 + R)^t} + \frac{F}{(1 + R)^T}$		
Equity Fundamental Valuation	Valuation Ratios and Growth	
Gordon Growth Model $V_0 = \frac{(1 + g)D_0}{R - g} = \frac{E[D_1]}{R - g}$	Dividends relative to EPS $D = (1 - b) \times EPS$	
General Dividend Discount Model $V_0 = \frac{E[D_1]}{1 + R} + \frac{E[D_2]}{(1 + R)^2} + \frac{E[D_3]}{(1 + R)^3} + \frac{E[D_4]}{(1 + R)^4} + \dots$	Expected Growth $g = b \times ROE$	
Expected Future Value Under GGM $E[V_1] = \frac{(1 + g)E[D_1]}{R - g} = (1 + g)V_0$	Price-to-Book Ratio $\frac{P_0}{BV} = \frac{(1 - b) \times ROE}{R - b \times ROE} = \frac{ROE - g}{R - g}$	
	Present Value of Growth Opportunities $V_0 = \frac{E[EPS_1]}{R} + PVGO$	

1 Multiple-Choice Questions

45 points.

1. A company issues a 2-year bond with the following characteristics: face value of \$1,000; 8% annual coupon; 5% yield to maturity. What is the present value closest to?
 - a. \$1056
 - b. \$967
 - c. \$1024
 - d. \$1122

2. You've accumulated \$12 thousand in credit card debt with an interest rate of 2% per month. You want to pay off the debt within 6 years. What is the minimum monthly payment you need to make?
 - a. \$248
 - b. \$336
 - c. \$316
 - d. \$255

3. An investor residing in New York City is in a combined 40% federal, state, and local tax bracket. They are evaluating two bonds with identical maturity and default risk: a corporate bond yielding 6.0% and a newly issued New York City municipal general obligation bond yielding 4.0%. Assuming the municipal bond is triple-tax-exempt for this resident, which bond should the investor logically choose, and what is the exact difference in their after-tax yields?
 - a. The municipal bond; its after-tax yield is 40 basis points higher.
 - b. The corporate bond; its after-tax yield is 200 basis points higher.
 - c. The corporate bond; its after-tax yield is 40 basis points higher.
 - d. The municipal bond; its after-tax yield is 240 basis points higher.

4. According to Andrew Lo, what is the reason firms are not doing the socially optimal amount of cancer research?
 - a. Cancer research overall is too expensive and risky, so it's not viable for a firm to undertake research on its own.
 - b. Most cancer treatments already on the market are sufficiently effective, so the marginal benefit of new research is limited
 - c. Governments strictly limit the amount of cancer research private firms are allowed to conduct.
 - d. Cancer treatments are already highly profitable, so firms have little incentive to invest further in cancer research.

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5. What is the relationship between bond yields and bond prices?
 - a. Linear
 - b. Reciprocal
 - c. Uncorrelated
 - d. Negative

6. Why did SPACs become less feasible over the last decade?
 - a. Lower interest rates
 - b. Higher interest rates
 - c. Decreasing venture capital funding
 - d. Reduced redemption rates

7. When the 10-year Treasury rate was falling in the late 1990s, what happened to the market P/E ratio?
 - a. It declined significantly
 - b. It remained roughly constant
 - c. It declined slightly
 - d. It increased significantly

8. Evaluate the following statements regarding the structural changes to the U.S. Treasury yield curve from September 23, 2024 to September 22, 2025.
 - I. Yields on the short end of the curve decreased.
 - II. Yields on the short end of the curve increased.
 - III. The 30-year long bond rate increased by approximately 75 basis points.
 - IV. The 20-year rate decreased by approximately 85 basis points.
 Which of the following combinations is entirely correct?
 - a. I and III only
 - b. II and III only
 - c. I and IV only
 - d. II and IV only
 - e. I, III, and IV only

9. An investor holds a 10-year, 4.00% annual coupon bond that is currently trading at a YTM of 3.00%. If macroeconomic conditions stabilize and market yields remain absolutely constant at 3.00% for the entirety of the next year, the bond's secondary market price will
 - a. Increase
 - b. Decrease
 - c. Stay the same
 - d. Need more information

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10. What is the average annual equity risk premium over the bonds since 1870?
- 2.55%
 - 14.15%
 - 7.81%
 - 5.26%
11. Assume a uniform discount rate of 8% (Effective Annual Rate) across all investments, and that all recurring cash flows begin exactly one year from today. Rank the following four financial instruments in order of their Present Value (PV), from lowest to highest:
- I. Perpetuity: An instrument that pays \$80 annually forever.
- II. Annuity: An instrument that pays \$102 annually for exactly 20 years.
- III. Zero-Coupon Bond: A bond with a face value of \$2,150 maturing in exactly 10 years.
- IV. Coupon Bond: A bond with a face value of \$1,000, paying a 7.9% annual coupon, maturing in 5 years.
- IV, III, I, II
 - III, IV, I, II
 - III, I, IV, II
 - I, III, IV, II
 - IV, I, III, II
12. The nominal yield on a newly issued 10-year United States Treasury note is 5.25%. Concurrently, the 10-year Treasury Inflation-Protected Securities (TIPS) yield is quoting at 2.15%. What is the market's implied *exact* annualized inflation expectation over the next decade?
- 3.10%
 - 3.03%
 - 2.95%
 - 7.51%
13. What type of asset is an oil future?
- Real asset
 - Derivative
 - Commodity
 - None of the above

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14. Which of the following are reasons why cascade risk events occur, as discussed in class?

- I. Complexity
 - II. Tight Coupling
 - III. Abundant Systems
 - IV. Human Behavior / Capacity for Mistakes
- a. I and II only
 - b. II and IV only
 - c. I, II, and IV only
 - d. I, II, and III only
 - e. I, II, III, and IV

15. Which of the following types of firms are classified as asset managers on the slides?

- a. Private Wealth
- b. Venture Capital
- c. New York Stock Exchange
- d. Households

2 Free-Response Questions

1. **9 points.** Suppose you observe these prices:

- Apple: \$1.00
- Pear: \$1.50
- PBJ Sandwich: \$3.00
- Bottle of Water: \$1.25
- Fruit Basket (8 apples, 3 pears, 4 PBJ sandwiches, and 6 bottles of water): \$34.

(a) If this food market worked like the financial markets, what riskless arbitrage could you capture, and how much would you make for every fruit basket?

(b) If the transaction costs were \$0.30 for every apple, does a riskless arbitrage still exist, and why?

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2. **9 points.** Suppose the yield to maturity on a one-year zero-coupon bond is 7%. The yield to maturity on a two-year zero-coupon bond is 6%. Additionally, the yield to maturity on a three-year zero-coupon bond is 5%.

(a) According to the Expectations Hypothesis, what is the implied one-year forward rate from year 2 to year 3?

(b) Consider an investor who is absolutely convinced that interest rates will not change, meaning that the entire yield curve will remain unchanged. Which of these three bonds, the one-year zero-coupon bond, the two-year zero-coupon bond, or the three-year zero-coupon bond, should this investor buy to maximize their one-year return (under their strongly-held belief about future rates)?

(c) An investor is considering financing the purchase of the one-year zero-coupon bond using a cash advance from a credit card that compounds interest monthly. Calculate the exact stated Annual Percentage Rate (APR) on the credit card at which the investor becomes financially indifferent to executing this leveraged strategy.

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3. **9 points.** A stock is currently priced at \$62. Two different investors (A and B) have their own views on the stock going forward.

(a) Next year, Investor A expects it to pay a \$3 dividend and trade at \$66. If the stock's required return is 9%, calculate its expected holding period return and explain what your result indicates about whether the stock is currently over-valued or under-valued for Investor A

(b) Let's say Investor B expects the company to undergo a two-year restructuring, paying \$0 in dividends at $t=1$ and $t=2$. At $t=3$, Investor B expects the company to issue a dividend of \$2.20, which will then grow at a constant rate of 6% a year indefinitely. If the stock's required return is 9%, what is the present value of the stock for Investor B?

(c) How does Investor B's present value of the stock compare to the present value of the stock for Investor A?

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4. **9 points.** You buy a 4-year zero-coupon bond with \$100 face value and 8% yield to maturity. You sell the bond after 2 years. Assume annual compounding.

(a) What was your annualized return if the bond's yield to maturity has risen to 10%?

(b) What if it has fallen to 4%?

(c) What if it remained 8%?

Government	Percentage
Current government	85%
Previous government	15%

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- 6. 10 points.** A firm has an expected earnings per share of \$6 next year. It retains 50% of earnings and has an ROE of 14%. Assume a required return of 10%.

- (a) If the firm paid out all earnings as dividends, what would its stock value be?

- (b) Calculate the growth rate. Using the Gordon Growth Model, what is the actual value of the stock?

- (c) What percent of the stock's price is attributable to growth opportunities?

- (d) Using the actual stock value calculated in part (b), calculate the firm's forward P/E ratio. If the firm generated \$5.61 in earnings per share over the past 12 months, calculate its trailing P/E ratio. Briefly explain the conceptual difference between these two valuation multiples.

Investment Management Midterm

B

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2 Free-Response Questions

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11. 9 points. [Question omitted from public preview]

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- (f) Calculate the growth rate. Using the Gordon Growth Model, what is the actual value of the stock?

- (g) What percent of the stock's price is attributable to growth opportunities?

- (h) Using the actual stock value calculated in part (b), calculate the firm's forward P/E ratio. If the firm generated \$5.61 in earnings per share over the past 12 months, calculate its trailing P/E ratio. Briefly explain the conceptual difference between these two valuation multiples.